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Evaluation of state and trait anxiety levels in adolescents undergoing endoscopy under anesthesia: A prospective study

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Abstract

Aim: Our study aimed to evaluate the pre-procedure state and trait anxiety levels of adolescent patients hospitalized for gastrointestinal endoscopy performed under sedation.

Material and Methods: In this study, 180 children between 11 and 18 years of age (77.5% girls) who were scheduled for anesthesia to undergo endoscopy at our hospital were included. The patients were asked to complete the state (STAI-I) and trait anxiety scale (STAI-II) forms.

Results: According to the STAI-I anxiety scale, the total average anxiety scale score was significantly higher for middle school students than high school students (p=0.004). With the increase of the mother's education, the STAI-I score also increased (p=0.04). In children living in rural areas compared to those living in cities, STAI-I and STAI-II scores were statistically significant (p<0.001). In line with the parents' income levels, STAI-I and STAI-II scores of the children also changed (p<0.001). The STAI-I score was higher in children who did not have a previous endoscopy history than those who had undergone endoscopy before (p=0.01). A weak negative correlation was observed between the age of the children and the STAI-I score (r=-0.195, p=0.033). A positive correlation was found between the number of siblings and STAI-II score (r=0.187, p=0.041).

Discussion: Increased anxiety before endoscopic anesthesia was observed in this population, including adolescents in low-income families, those from families with many children, and those from families living in rural areas.

Keywords

Adolescent, Anxiety, State and Trait Anxiety, Endoscopy, Anesthesia

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Introduction

Anxiety is a disorder that is more relevant for adults. It is detected at a frequency of approximately 6.5% in childhood and adolescence [1]. Anxiety is usually considered in the two different forms of state anxiety and trait anxiety [2]. State anxiety can be defined as follows: (i) the emotional reaction that occurs due to the interpretation of certain situations as threatening; (ii) the subjective fear felt by an individual concerning a stressful situation experienced by the person. Its severity and duration are related to the perceived threat and the persistence of one's interpretation of the dangerous situation. The state anxiety level increases when the stress is intense and decreases when the stress disappears. Trait anxiety, on the other hand, may be explained as an individual's overall tendency toward a state of anxiety. Individuals with more prominent trait anxiety have a tendency to perceive their situations as constantly stressful, and they experience a feeling of unhappiness and discontent as a result of the perception of a threatening element. Individuals with high levels of trait anxiety can be easily demoralized, become pessimistic, and are demonstrated to experience increased levels of state anxiety more frequently [3].

Adolescence, a period in which physiological and hormonal developments are extremely swift, is also a time in which individuals' self-expression needs and emotional ups and downs are most intense. The periods of growth and development have an unstable status while emotional evolution continues. Illness is one of the common sources of stress in any individual and may be particularly influential among developing children. It has been found that surgical or interventional procedures performed for children affect the children's and their mothers' anxiety levels and quality of life [4]. Additionally, a child's response to ordeals may be associated with family structure and the parents' socioeconomic and educational status. With these points in mind, we aimed to evaluate the anxiety and trait anxiety levels of adolescents scheduled for gastrointestinal (GI) endoscopy under sedation after being admitted for a single day in patients before the procedure.

Material and Methods

A total of 180 pediatric patients who underwent GI endoscopy in our hospital between June 1, 2019, and March 1, 2020, were included in our study. Approval was obtained from the local ethics committee (2011-KAEK-25 2019/05-13) and informed consent was received from the patients' relatives. In addition, demographic data (age, gender, height, weight, educational status, school, and grade), additional diseases, and additional diagnoses were recorded. Children aged 11-18 years, ASA I-II, cooperative, literate, and undergoing elective endoscopic procedures were included in the study. Children younger than 11 years old, uncooperative, illiterate, with known psychiatric disorders or usage of psychiatric drugs, or undergoing endoscopy due to an emergency such as ingestion of a caustic substance were excluded from the study. Before the procedure, a form evaluating state and trait anxiety levels (Spielberger's State and Trait Anxiety Scale) and another form consisting of demographic data were distributed to the patients in the waiting room. We requested that the children fill out the forms themselves. After monitoring in the endoscopy unit, sedation was administered with routine IV anesthetic drugs by an experienced anesthesiologist (midazolam, 0.05-0.1 mg/kg; propofol, 1.0 mg/kg). Oxygenation was provided with nasal O2 in all patients. Heart rate (HR), mean arterial pressure (MAP), and oxygen saturation (SpO2) were monitored. Complications (bradycardia, tachycardia, arrhythmia, hypotension, hypertension, bronchospasm, decrease in SpO2, apnea) were recorded.

Spielberger State and Anxiety Scale

Spielberger developed the State Anxiety Scale (STAI) in 1970, and the validity and reliability study for the Turkish form was conducted by Oner et al. in 1983 [11, 12]. Both subsections (I and II) are responded to in the style of a Likert-type scale. While the STAI-I anxiety level is scored as "(1) never, (2) somewhat, (3) frequently, and (4) almost always," the scoring options for the STAI-II are "(1) almost never, (2) sometimes, (3) most of the time, and (4) almost always." There are two types of expressions on these scales. Direct expressions reflect negative emotions while the other type reflects reversed expressions that represent positive feelings. Two different total score weights are calculated for each of the direct and reverse expressions. The total score for reverse expressions is subtracted from the total score obtained for direct expressions and then a predetermined and unchanging value is added to this score (50 was added to the score obtained for the STAI-I as the constant value, while for the STAI-II, this value was 35). The final value obtained is the individual's anxiety score. Theoretically, the scores obtained from both scales vary between 20 and 80. A higher score indicates a high anxiety level and a lower score indicates a low anxiety level. The average score level has been reported to range from 36 to 41 in various applications. The classification of anxiety levels (none, mild, moderate, severe, and panic-level anxiety) was performed (Figure 1).

Statistical Analysis

Statistical evaluations were conducted using SPSS 23.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics for numerical variables were expressed as mean ± standard deviation, while numbers (n) and percentages (%) were used for categorical data. The compliance of variables to normal distribution was evaluated with the Kolmogorov-Smirnov test. The Student t-test was used to compare variables with normal distribution. The Kruskal-Wallis test was used for multiple comparisons that did not conform to normal distribution. Pearson correlation was calculated for the correlation analyses between continuous variables. Results were evaluated at a 95% confidence interval and any p-value of <0.05 was considered significant.

	Scores	Anxiety Level
The State Trait Anxiety Scale	Score between 0-19	No anxiety
	Score between 20-39	Mild anxiety
	Score between 40-59	Moderate anxiety
	Score between 60-79	Severe anxiety
	80 and above score	Panic level anxiety

Figure 1. Classification of anxiety level according to the scores obtained from the State Trait Anxiety Scale

Results

Sociodemographic characteristics of the 180 patients included in the study are shown in Table 1. Upper GI endoscopy was performed for 92.2% (n=166) of the patients, while colonoscopy and endoscopy were performed in 7.8% (n=14). The patients' STAI-I total mean anxiety level was measured as 41.60±11.07 and the STAI-II total mean anxiety level was 42.40±8.37. Thus, moderate anxiety was observed in the majority of children according to scale classification (Figure 1). The majority of the parents' education level was primary school (70.6% and 50.6%, respectively). The vast majority of the fathers were laborers and the mothers were mostly housewives. According to the STAI-I anxiety scale, the total average anxiety score among students in middle school was significantly higher than the average anxiety score among high schoolers (p=0.004) (Table 2). Higher mother's education was also significantly associated with higher STAI-I anxiety scale scores (p=0.04) (Table 2). For children living in rural areas compared to children living in cities, STAI-I and STAI-II anxiety scale scores were found to be statistically significant (p<0.001) (Table 2). According to parents' income levels, children's STAI-I and STAI-II anxiety scale scores also changed, which was significant (p<0.001) (Table 2). The STAI-I anxiety scale score was significantly higher in

Table 1. Demographic and sociocultural characteristics of the patients [n (%), mean±SD]

	n=180 (%)
Gender	
Male	41 (22.5)
Female	139 (77.5)
Age (years)	15.9±1.76
Weight (kg)	54.90±13.51
Height (cm)	161.25±9.09
ASA	
I	172 (95.6)
II	8 (4.4)
Mother's age (years)	41.32±5.66
Father's age (years)	44.87±6.35
Number of siblings	2.72±1.36
Education level of child	
Middle school	59 (32.8)
High school	121 (67.2)
Education level of mother	
Primary school	127 (70.6)
Middle school	37 (20.6)
High school	16 (8.9)
Education level of father	
Primary School	91 (50.6)
Middle school	43 (23.9)
High school	42 (23.3)
University	4 (2.2)
Mother's profession	
Housewife	144 (80.0)
Laborer	31 (17.2)
Civil servant	5 (2.8)
Father's profession	
Laborer	146 (81.1)
Civil servant	18 (10.0)
Retired	16 (8.9)

M: Male; F: female; ASA: American Society of Anesthesiologists.

Table 2. Comparison of scales according to gender and hospital experiences

	STAI-I	STAI-II
Gender		
Female	45.66±10.56	41.29±10.33
Male	44.13±9.17	40.51±10.18
	p=0.53	p=0.73
Education level		
Middle school	47.89±7.92	42.37±9.49
High school	42.96±9.75	40.55±10.5
	*p=0.004	p=0.35
Education level of mother		
Primary school	43.06±8.69	40.18±10.65
Middle school	47.26±11.30	43.47±9.6
High school	50.40±8.64	43.80±7.02
	**p=0.044	p=0.297
Education level of father		
Primary school	44.09±8.58	40.95±10.32
Middle school	44.81±10.85	43.81±9.26
High school	45.28±9.25	38.53±11.09
University	44.48±9.47	44.33±5.68
	p=0.97	p=0.34
Income level		
Low	49.65± 9.13	45.47±8.56
Middle	44.51±8.71	40.83±10.12
High	40.69±7.04	36. 87±9.88
	p<0.001	p<0.001
Residential area		
City	49.10±9.57	44.10±10.1
Village/town	44.09±8.61	40.63±9.90
	p<0.001	p=0.038
History of endoscopy		
Yes	41.12±10.00	39.12±11.91
No	46.09±8.82	42.07±9.29
	*p=0.012	p=0.18
Hospitalization in the family		
Yes	44.19±9.39	40.66±10.70
No	44.89±9.67	41.77±9.65
	p=0.69	p=0.55

STAI: State-Trait Anxiety Inventory. *: p<0.05, Student t-test; **: p<0.05 Kruskal-Wallis test.

Table 3. Correlation analysis between the scales and child age, parental ages, and number of siblings.

	STAI-I r, p	STAI-II r, p
Age	r=-0.195	r=-0.103
	*p = 0.033	p=0.262
Number of siblings	r=0.087	r=0.187
	p=0.342	*p=0.041
Mother's age	r=0.035	r=0.07
	p=0.706	p=0.244
Father's age	r=-0.084	r=-0.57
	p=0.363	p=0.535

STAI: State-Trait Anxiety Inventory. r: Pearson correlation analysis. *: p<0.05.

children who did not have an endoscopy history than those who had previously undergone endoscopy (p=0.01) (Table 2). A weak negative correlation was observed between the children's age and STAI-I scores (r=-0.195, p=0.033) (Table 3), while a positive correlation was found between the number of siblings and STAI-II scores (r=0.187, p=0.041) (Table 3). Midazolam and propofol were administered for anesthesia. The average HR measured during the intervention was 92.85±8.51 and the average SpO2 level was 98.81±0.77. In terms of complications, nausea was identified in 17 patients, vomiting in 6 patients, and a decrease in oxygen saturation in 14 patients.

Discussion

Gastrointestinal endoscopy is an effective method used for the diagnosis and treatment of various pediatric GI disorders. In outpatient endoscopy applications, anxiety is observed in many patients. In addition, pediatric patients and their parents have anxiety due to pain associated with the intervention and possible complications. The necessity of anesthesia for preventing pain is crucial for them [5]. Therefore, sedation is frequently used in pediatric patients to increase procedure safety, success, and patient comfort [6]. This study examined pre-procedural anxiety levels in pediatric patients who underwent elective upper GI endoscopy or colonoscopy with sedation concerning age, gender, education, and socioeconomic conditions affecting this anxiety.

Adolescence shows great differences between genders and even individuals [7]. Studies revealed that GI endoscopy in children is mostly performed for girls [8, 9]. Similar to the literature, in our study, GI endoscopy application was observed more frequently in girls than in boys (77.5%). It can be considered that girls have a higher frequency of GI diseases than boys. They may also be applying to the hospital at more frequent intervals due to their different biological and personality structures, mental characteristics, coping styles, and social and cultural positions. In parallel with this, when the literature is reviewed to assess differences between the genders for anxiety, it is seen that female patients are reported to have higher anxiety levels than males [10, 11]. However, in another study, when adolescents' state and trait anxiety scores were examined in terms of gender, there was no statistically significant difference between male and female adolescents [12]. Similarly, in our study, there was no difference between the mean anxiety scores of the girls and boys.

Anxiety can be inspected at any age and in all age groups for different reasons. Çubukçu and Ercan examined the effect of sociodemographic characteristics of children on dental care-related anxiety. Dental care-related anxiety was seen to decrease with increasing age [13]. Similarly, a study examining the relationship between pre-procedural anxiety levels and conscious sedation practices in patients undergoing GI endoscopy found that anxiety decreased with increasing age [14]. In our study, a negative correlation was found between age and state anxiety scale scores, in accordance with the literature. Analyzing these data, it can be asserted that, as the age of the child increases, fear and anxiety related to medical procedures decreases. Likewise, patients in middle school had significantly higher state anxiety levels than those in high school. This situation suggests that increased age and education levels result in improved abilities to handle anxiety.

The state-trait anxiety level is affected by the individual's current state and conditions such as the parents' ages, education, lifestyle, and personality features. For example, Battal et al. reported that psychiatric scale scores increased in children with younger mothers with greater anxiety [15]. In another study, however, it was observed that there was no difference or correlation between maternal age and state and trait anxiety scale scores [16]. In studies investigating the effects of parents' education levels, it was reported that the mother's education level did not affect anxiety, whereas, in another study, higher maternal education was associated with increased anxiety [17, 18]. In our study, no statistically significant correlation was observed between the total score of the scales and the age of the mother and father. Despite this, we observed that state anxiety also increased as the mother's education level increased, but the father's education level was not effective on state anxiety. This may be explained by the fact that the person closest to the child is the mother, and improvement in the level of consciousness of the mother with knowledge acquired from education affects the level of anxiety.

Another subject emphasized in studies is that economic stress can affect adolescent development by influencing parents' negative emotions and making them more susceptible to future stressors [19, 20]. Studies have found that children who face financial difficulties at home during adolescence have lower self-confidence, higher levels of distress, and more social and emotional problems. In these circumstances, adolescents are more sensitive and negative in their relationships with others [21, 22]. Similarly, in our study, an increased level of anxiety was observed in adolescents with low socioeconomic levels. As the cause of this situation, low socioeconomic level and multi-sibling adolescents living in rural areas were evaluated as having inadequate doctor-family communication. The lack or failure of family-child information and the reflection of the family's stress onto the child should be other criteria to consider in approaching adolescents. Insufficient preparation for processing, especially in children from large families with low socioeconomic levels, was associated with increased anxiety.

A previous study investigated the anxiety levels of mothers whose children had histories of hospitalization versus mothers whose children had not been hospitalized before. There were significantly higher state anxiety scale scores among the mothers whose children were previously hospitalized. However, there was no difference or correlation between the mother's age and state and trait anxiety scale scores [16]. No difference was observed in anxiety scale scores in children with a family history of hospitalization in our study. However, the state anxiety scale scores were lower in children who had previously experienced endoscopy. Positive and unproblematic previous endoscopy experience can support the child's sense of security. It is thought that information about procedures assists the child in understanding what awaits him or her and thus reduces anxiety. It is also noteworthy that as the number of siblings increases, state-trait anxiety scores also increase. Charan et al. found a correlation of being an only child with a high level

of anxiety [23]. On the contrary, our study observed that the number of siblings increased trait anxiety in children. High trait anxiety suggests that children are under stress in their home life.

Limitations

The main limitations of our study are its single-center nature, lack of information on anxiety status before admittance or after the intervention, lack of parental anxiety level assessments, and the fact that we did not determine the causes of anxiety in children. Furthermore, pre-anesthesia patient visits, informative dialogues with the patients and their relatives (pre-anesthesia interviews), and premedication before the procedure were not performed. In addition, we did not assess the depth of anesthesia during the procedure, which may be another limitation of the study.

Conclusion

In this study, we observed that individual and sociocultural characteristics affect pre-intervention anxiety in adolescents. Anxiety levels were higher in children living in rural areas and children from families with low income levels. We think that communication between physicians and patients is important before the intervention.

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Scientific Responsibility Statement
The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest
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